Rule CIC341:   LOC=ANY requests were unable to obtain storage and failed

Finding: The CICS Shared Temporary Storage Queue Server statistics showed that a high percent of LOC=ANY storage requests initially failed to obtain the requested storage, were retried after merging adjacent small free areas to form larger areas, and failed because the requested amount of storage was unavailable.

Impact: This finding has a HIGH IMPACT on the performance of the CICS region.

Logic flow: This is a basic finding, based on an analysis of the data. The finding applies only with CICS/Transaction Server for OS/390 or for z/OS.

Discussion: Data items in shared temporary storage are kept in queues whose names are assigned dynamically by the program storing the data. These shared temporary storage queues are stored in *named pools* in an MVS coupling facility. A shared TS pool consists of an XES list structure on the coupling facility.

Access to a shared temporary storage pool by CICS transactions running in an AOR is through a TS *data sharing server* that supports a named pool. The data sharing server is started in its own region, by executing DFHXQMN. Various parameters are provided to DFHXQMN (POOLNAME, MAXQUEUES, BUFFERS, etc.) to allow tailoring of the data sharing server.

A data sharing server must be started on each MVS image for <u>each pool</u> defined in a coupling facility which can be accessed from that MVS image. All shared TS pool access is performed by cross-memory calls to the data sharing server for the named pool. The authorized cross-memory (AXM) page allocation services are used to manage server region storage after the server has been initialized.

During server initialization, the data sharing server acquires all of the available storage above the 16M line, as determined by the REGION size, then releases 5% of it for use by operating system services. This storage is referred to as *AXMPGANY* pool. The server also acquires 5% of the free storage below the line for use in routines which require 24-bit addressable storage. This storage is referred to as *AXMPGLOW* pool. Server statistics indicate how much storage is actually allocated and used within the storage areas above the 16M line (AXMPGANY pool) and below the 16M line (AXMPGLOW pool).

Storage is initially allocated from the pool using a bit map. For faster allocation, free areas are not normally returned to the pool but are added to a *vector of free chains* depending on the size of the free area (1 to 32 pages). When storage is being acquired, this vector is checked before going to the pool bit map.

If there are no free areas of the right size and there is not enough storage left in the pool, free areas in the vector are put back into the pool, starting from the smallest end, until a large enough area has been created. This action appears as a compress attempt in the statistics. If there is still insufficient storage to satisfy the request, the request fails.

If a task in the server region or a cross-memory request runs out of storage, this is likely to result in AXM terminating that task or request using a simulated ABEND with system completion code 80A to indicate a GETMAIN failure. Although the server can usually continue processing other requests, running out of storage in a critical routine can cause the server to terminate.

Shared temporary storage queue server storage statistics are available in MXG file CICXQ3. CPExpert produces Rule CIC341 when the number of storage requests in the AXMPGANY pool that failed after retry (variable S3ANYRQS[1]) is greater than the value specified by the **TSANYRQS** guidance variable in USOURCE(CICGUIDE). The default value for the **TSANYRQS** is 0, indicating that CPExpert should produce Rule CIC341 when any storage request in the AXMPGANY pool failed after retry.

Suggestion: If this finding is produced, you should consider the following alternatives:

- Increase the amount of storage that is available for the shared TS server identified by this finding. Increasing the amount of storage can be accomplished by increasing the REGION parameter on the EXEC Job Control Language that starts the server.

  The queue server REGION parameter JCL should specify at least enough virtual storage for the specified number of buffers plus the storage used to process queue requests. Each buffer occupies a little more than 32K bytes, and each connected CICS region can have up to ten queue requests active at a time, each using 5K to 10K bytes. IBM suggests that the REGION size should allow at least 32K per buffer and 100K for each connected CICS region, plus a margin of about 10% for

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[1]Please note that the *CICS Performance Guides* describe S3ANYRQF as failed requests and S3ANYRQS as requests to release storage. These descriptions were "reversed" initially, but IBM Hursley corrected the *CICS Performance Guide with document* SC34-6009-05. S3ANYRQF is the requests to "free" or release storage and S3ANYRQS is number of failed requests because of "short on storage".

other storage areas. You might wish to increase the REGION parameter to larger values than the IBM recommendation if storage requests fail.

- Decrease the BUFFERS initialization parameter to leave more storage for request processing.

    - You probably **should** take this action if Rule CIC332 (*Excess buffers defined for queue index buffer pool*) has been produced.

    - You normally should **not** take this action if either Rule CIC330 (*High percent shared TS queue index buffers were in use*) or Rule CIC331(*High percent LRU activity in the TS queue index buffer pool*) had been produced, since these rules warn of potential pending storage shortage in the TS queue index buffer pool.

- Examine the tasks using the shared temporary pool to determine whether some tasks could use a different shared temporary storage pool.

- Change the TSANYRQS guidance variable in USOURCE(CICGUIDE) so Rule CIC341 is produced only when you wish to be aware of a different number of storage requests in the AXMPGANY pool that failed after retry. Since Rule CIC341 describes a situation that has a high impact on the performance of the CICS region, **you should not normally change the TSANYRQS guidance variable**.

Reference: *CICS/TS for OS/390 Release 1.1*
        CICS System Definition Guide: Section 3.4.3 (Defining TS server regions)

        CICS/TS for OS/390 Release 1.2
        CICS System Definition Guide: Section 3.4.3 (Defining TS server regions)

        CICS/TS for OS/390 Release 1.3
        CICS System Definition Guide: Section 4.2.2 (Defining TS server regions)

        CICS/TS for z/OS Release 2.1
        CICS System Definition Guide: Chapter 21 (Starting a temporary storage server)

        CICS/TS for z/OS Release 2.2
        CICS System Definition Guide: Chapter 21 (Starting a temporary storage server)